

Metamaterials and Symmetry

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Metamaterials are artificially designed subwavelength composites that possess extraordinary properties not existing in naturally occurring materials. In particular, they can alter the propagation of electromagnetic waves resulting in negative refraction, subwavelength focusing and even in cloaking of macroscopic objects. Such unusual properties can be obtained by a careful design of dielectric or metal-dielectric composites on a deep sub-wavelength scale. The metamaterials may have profound impact in wide range of applications such as nano-scale imaging, nanolithography, and integrated nano photonics. I will discuss a few recent experiments demonstrating intriguing phenomena associated with Metamaterials. These include sub-diffraction limit imaging and focusing, New type of symmetries available in Metamaterials, negative-index metamaterials and all-dielectric “carpet cloak” with broad-band and low-loss performance. I will also present our recent demonstration of sub-wavelength plasmonic laser